MONROE

Compact Electric

Model LA-9

CALCULATOR

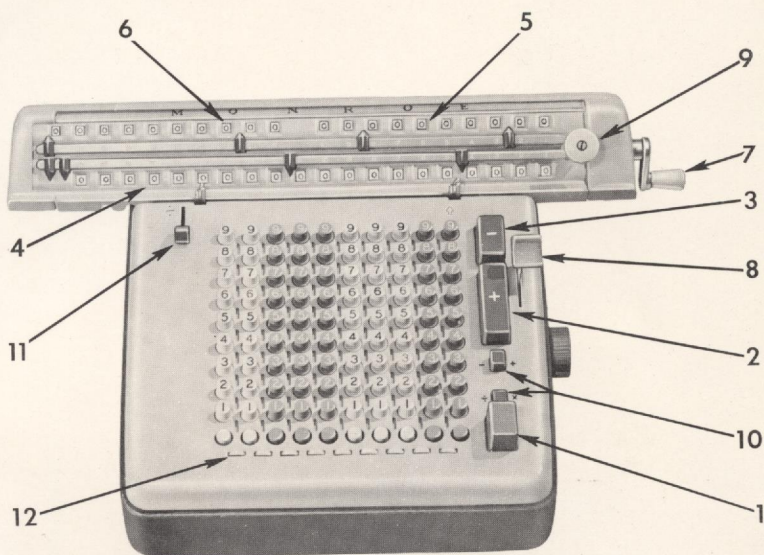## instructions

MONROE CALCULATOR

MODEL LA-9

The machine illustrated is the LA 9-203 which has a ten col-
umn keyboard, ten upper dials, and a lower dials capacity
of twenty places. Model LA 9-163, with the same features
and controls, has a slightly smaller capacity: eight
column keyboard, eight upper dials, and sixteen lower
dials. These instructions apply to both Monroes as the
method of operation for the two models is exactly the same.

Operating Controls

1   Keyboard Clear Key

2   Plus Bar

3   Minus Bar

4   Lower Dials

5   Right Upper Dials

6   Left Upper Dials

7   Dials Clear-out Crank

8   Carriage Quick-Shift Control

9   Carriage Lift-to-Shift Knob

10   Program Keys

11   Automatic Divide Control

12   Keyboard Decimals

One-hand operation is fast and efficient. Proficiency is quickly acquired because the controls are grouped in a compact area. There is no reaching and all operations are performed by the one hand. That leaves the other always free to handle papers and follow the figure work.

OPEN FOR ILLUSTRATION OF MACHINE

A FEW WORDS TO THE OPERATOR

The Monroe Makes Figuring Easy and Pleasant

NOW that you are going to use a Monroe, you can really enjoy figure work. Operating the Monroe is extremely simple and easy; it takes no effort and there is no mental strain. It will save you lots of time and you will be amazed at the amount of work you will soon be turning out. Even if you operate the Monroe steadily, hour after hour, you will not feel a bit fatigued. You will work with greater assurance, too, because you will know your answers are accurate for you check them as you go along.

These instructions will get you off to a good start if read and followed carefully. The rules are few and simple and can be readily understood for they are the familiar ones of arithmetic that you have always used for paper and pencil figuring. As soon as you are clear on the fundamentals you can immediately start applying them to any and all types of business figure work, such as checking invoices, discounting, finding percentages, prorating.

The Monroe is sturdily built for years of satisfactory and dependable service if, like a car or watch, it is given just a reasonable amount of care. Guard against paper clips or other small objects falling into it, letting it drop, or having anything heavy fall on it. If it seems to be in need of attention, do not try to fix it yourself for adjusting and oiling should be done only by a trained mechanic. Call the nearest local office of the Monroe Company and a serviceman will drop by to make an inspection.

Clearing the Monroe

When you sit down to use the Monroe be sure that results of previous work have not been left in the machine. Let it become a habit to clear the dials immediately before starting a new problem. Clearing is so simple it quickly becomes practically automatic.

To clear an amount
from the keyboard...........*Depress clear key (1)*

To clear upper dials.........*Make a complete forward (clockwise) turn of the dials clear-out crank (7)*

To clear lower dials.........*Make a complete backward (counterclockwise) turn of the dials clear-out crank (7)*

Turns of the dials clear-out crank must be complete ones and the crank stopped in its neutral position, which is at the lowest point of the turn. When a turn has been started it is not possible to reverse the crank; the turn must be completed in one direction before a reverse turn can be made.
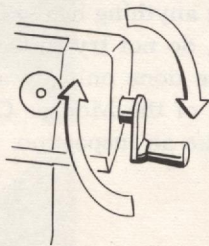
A forward turn of the clear-out crank clears upper dials
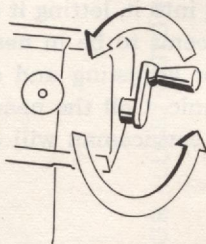
Backward turn of the crank clears the lower dials

MONROE CALCULATOR MODEL LA-9

The Operating Controls and Their Use

Although you will be turning out your figure work on the Monroe in no time at all, if you are a beginner it is well first to become familiar with the operating parts of the machine and know how they are used. Read this section carefully. The paragraphs describing the controls are numbered so you can instantly identify them in the illustration. As you go along, maybe you will want to try using each control as directed; that will accustom you to operating it properly.

As with every Monroe Calculator, all amounts for addition, subtraction, multiplication, and division are entered in the Model LA-9 by being set on the single keyboard. The operations are carried out by the plus and minus bars and other controls. Results and proofs of the operations are registered in the dials of the carriage.

The Monroe keyboard is the standard, flexible type so that if any figure is incorrectly set it can be changed immediately by depressing the correct key in the same column.

Keyboard Clear Key (1)   A key set in any row is released by depressing the unnumbered or zero key at the bottom of that column. An entire amount set on the keyboard is released by depressing the keyboard clear key.

Plus Bar (2)   The plus bar is used for forward cycles of the machine to perform addition and multiplication. It is depressed once for each amount to be added. For multiplication it is held depressed until the machine makes the number of cycles desired.

Minus Bar (3)   The minus bar is depressed for reverse operations of the machine. It is depressed once for each amount to be subtracted.

Lower Dials (4)   Results in addition, subtraction, and multiplication appear in the lower dials. In division the dividend is regis-

3

tered in the lower dials which will show any indivisible remainder after the division.

Right Upper Dials (5)   The right upper dials are called the multiplier dials as they register one of the factors in a multiplication. In adding they count the number of items added.

Left Upper Dials (6)   The left-hand set of upper dials have black and red figures. They register the answer (quotient) of division work in red figures. The purpose of the black figures will become apparent in the applications section of these instructions.

Dials Clear-out Crank (7)   Figures are cleared from the dials by means of the small crank. A complete forward (clockwise) turn returns all upper dials to read zero. A complete backward (counterclockwise) turn returns all lower dials to zero. A turn in either direction, once started, must be fully made, bringing the crank to the lowest position.

Carriage Quick-Shift Control (8)   The carriage is shifted in either direction, one position at a time, by this lever. A downward stroke shifts the carriage to the right; an upward stroke shifts it to the left.

Shifting the carriage to the left; most operators generally like to use the thumb
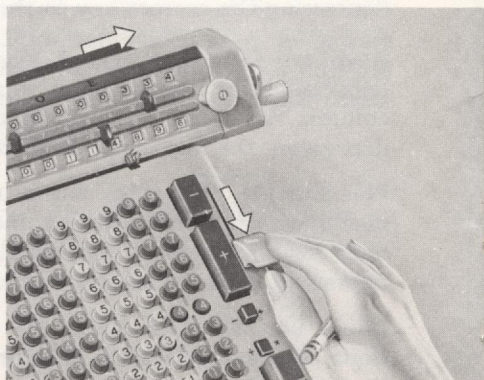
Shifting the carriage to the right; can be by index finger or thumb as preferred

Carriage Lift-to-Shift Knob (9)   Sometimes it is more convenient to shift the carriage a number of places at one time by raising the carriage slightly by means of this knob and moving it to the desired position. The operating position of the carriage is pointed out by the small arrow on the keyboard over the first right-hand column.

Program Keys (10)   To program the Monroe for addition and subtraction the upper key marked with the + and − signs is depressed. For multiplication and division the lower key marked with those symbols must be depressed. However, in the latter case addition and subtraction can also be performed but the keyboard will not automatically clear.

Automatic Divide Control (11)   After aligning a dividend in the lower dials with the divisor on the keyboard, this lever is moved up. The Monroe automatically carries out the division. Before it is completed a division can be stopped at any point by moving the automatic divide control lever down.

Keyboard Decimals (12)   Markers are provided as a visual guide for pointing off the decimals in figures on the keyboard and in the dials. Decimals are shown on the keyboard by red lines between the rows of keys. They are set by turning the small rims on the lower part of the keyboard. Movable pointers are placed where decimals are needed for amounts registered in the upper and lower dials.

Moving the carriage by
the Lift-to-Shift knob

5

Decimals are Automatic on the Monroe

Calculating with figures having decimals is very easy on the Monroe and you are always sure of the accuracy of your answers for they are automatically pointed off. The method for arranging the machine for decimals is according to this simple rule.

The Monroe Rule

The number of decimal places being used on the keyboard PLUS the number of decimal places being used in the upper dials EQUALS the number of places to be used in the lower dials.

Or the Monroe rule can be expressed briefly this way:

Keyboard decimal + upper dials decimal = lower dials decimal

You will recognize this as the same rule you have followed for years when figuring by scratch pad. Again you see how the Monroe operates on a familiar principle of elementary arithmetic.

As a visual aid, decimal places in the dials are indicated by setting the small, movable pointers on the carriage. The decimal points are set on the keyboard by turning the small knurled parts (12). For instance, if a figuring job has amounts with three and four decimals and the operator wants to work with three decimals on the keyboard, the decimals would be set thus:

3 keyboard + 4 upper dials = 7 lower dials

A decimal marker is set at 4 on the upper dials slide and a marker at 7 on the lower dials slide; a decimal marker would be turned on the keyboard between the third and fourth columns.

Fractions

Fractions are always expressed as decimals and the work is performed just as with whole numbers. Thus: $\frac{1}{2}$ = .5; $\frac{1}{4}$ = .25; $\frac{5}{8}$ = .625; $41\frac{3}{4}$ = 41.75; $1084\frac{1}{16}$ = 1084.0625.

6

How to Add, Subtract, Multiply, and Divide

Both addition and subtraction can be performed on the Monroe with the carriage in any position but usually it is placed in the first position; that is, shifted to the extreme left so that the first right-hand lower dial is directly in line with the arrow above the first right-hand row of keys. The + program key should be depressed so that each amount clears automatically from the keyboard as it is added.

Addition

Example
```
   12
   30
   44
   ──
   86
```

Step 1   Set 12 on the right of the keyboard. Depress plus bar by touching it lightly once.

Step 2   Set 30 on the right of the keyboard (it is not necessary to depress a key to set a zero on the Monroe). Depress plus bar once.

Step 3   Set 44 on the keyboard. Depress plus bar.

Results   Lower dials   86   Total
            Right upper dials   3   Number of items added

Clear both upper and lower dials.

Addition With Decimals

If the figures to be added are dollars and cents amounts, a decimal marker can be set to point off the two right-hand lower dials to represent the cents columns. The keys are colored according to the usual dollars and cents system.

Example
```
     14.96
      5.00
   3058.73
   ───────
   3078.69
```

7

Step 1   Set 14.96 on the keyboard. Depress plus bar.

Step 2   Set 5.00 on the keyboard. Depress plus bar.

Step 3   Set 3058.73 on the keyboard. Depress plus bar.

Result   Lower dials   3078.69   Total

Do not clear dials.

Subtraction

Example   3078.69
                −2147.92
                ─────────
                 930.77

Step 1   If the 3078.69 were not already in the lower dials it would be necessary to set that amount on the keyboard and register it by depressing the plus bar once. However, since the 3078.69 remains there from the previous example, proceed to the next step.

Step 2   Set 2147.92 on the keyboard. Depress minus bar.

Result   930.77   Remainder

Multiplication

Multiplication with the Monroe is just as simple as addition because, in fact, it is nothing more than a series of repeated additions. One amount is set on the keyboard and the other factor "written" in the right upper dials by the plus bar. The × program key must be depressed.

Example   33 × 3 = 99

Step 1   With the carriage in the first position, set 33 on the keyboard.

Step 2   Hold plus bar depressed until a 3 appears in the right-hand upper dials.

8   *Result*   99   Product

Clear both upper and lower dials before doing another multiplication with slightly larger figures.

Example   235 × 42 = 9870

Step 1   Set 235 on the keyboard. Hold plus bar depressed until a 2 is registered in the first place of the multiplier dials.

Step 2   By a downward stroke on the Quick-Shift control, shift carriage one place to the right. Hold plus bar depressed until a 4 is registered in the second multiplier dial.

> *Result*   Lower dials   9870   Product

Before clearing the figures, notice how the work can be proved at a glance. The multiplicand, 235, is on the keyboard; the multiplier, 42, shows in the upper dials. You know the result in the lower dials is correct without figuring a second time.

Multiplication on the Monroe Calculator can be performed with the carriage in any position and shifting in either direction. For instance, in this example the multiplication can be started with the carriage in the second position and multiplying by 4; then after shifting the carriage to the left multiplying by 2 in the first upper dial.

Multiplication With Decimals

Example   80½ lbs.   @ $3.02 per lb.   = $243.11

Decimals   Keyboard   2   × Program Key Depressed
             Upper Dials 2
             Lower Dials 4

Step 1   With the carriage in the first position, set 80.5 on the keyboard. Depress plus bar to multiply by 2.

Step 2   As there is no figure to be registered in the second position in the upper dials, make two downward strokes on the Quick-Shift control to move the carriage into the third position. Multiply by 3.

> *Result*   Lower dials   243.11

9

If, by mistake, the plus bar is held depressed too long and a number greater than desired is registered in the upper dials, the correction can be made instantly without doing the problem over. Without clearing the machine simply position the carriage so the arrow on the keyboard points to the upper dials position where the figure is incorrect. Then by means of the minus bar reduce the digit to the correct figure. Similarly, if a figure in the multiplier is less than the required figure, the correction is made by depressing the plus bar. The principle of this operation will be brought out in performing the next example.

Multiplication With Constant

Example   43 gals. @ $1.35 = $ 58.05
             35 gals. @ 1.35 =   47.25
         136 gals. @ · 1.35 = 183.60

Step 1   Set 1.35 on the keyboard. Multiply by 43.

    Result Lower dials 58.05 First extension

After noting the result do not clear any of the dials or the keyboard.

Step 2 With 1.35 still on the keyboard, change the amount in the multiplier dials, by plus and minus operations, to the next number of gallons, 35. Reduce the 4 to 3 in the second upper dial by depressing the minus bar once; shift the carriage to the first position and increase the 3 to 5 by depressing the plus bar for two cycles. The figures in the lower dials are changed automatically.

    Result Lower dials 47.25 Second extension

Note answer but do not clear machine.

Step 3 By means of the plus and minus bars and shifting, change the upper dials figures to read the next multiplier, 136.

    Result Lower dials 183.60 Third extension

Short-cut Multiplication

When a multiplier is an amount with 6's, 7's, 8's, or 9's (for example, 49, 378, etc.), the number of machine revolutions can be reduced by means of a combination of plus and minus bar operations called short-cut multiplication.

Example   458 × 17 = 7786

Step 1   By a downward stroke on the Quick-Shift control, shift carriage to second position. With plus bar multiply by 2 (20).

Step 2   By upward stroke of Quick-Shift, move carriage to first position. Hold minus bar depressed for three revolutions, changing the upper dials multiplier to 17 (20 — 3 = 17).

Result   Lower dials   7786

Practice several short-cut multiplications, such as: 125 × 48 (50 — 2); 855 × 259 (260 — 1); 1203 × 979 (1000 — 21). With just a little practice you will quickly become skilled and save a great deal of time and work. See page 20 for additional instructions and suggestions for short-cutting.

Division

Division with the Monroe LA-9 is extremely fast because it is performed fully automatically. To divide, the dividend is set on the keyboard and registered in the lower dials. After the 1 is cleared from the upper dials the divisor is set on the keyboard and the carriage moved to align the first left-hand digit of the divisor on the keyboard with the first left-hand digit of the dividend in the lower dials. As soon as the automatic divide control (11) is moved up, the Monroe carries out the division and the answer appears in red figures in the left upper dials. The ÷ program key must be depressed for division.

Example   1875 ÷ 15 = 125

Step 1   With the carriage in the first position set the dividend, 1875, on right of keyboard. Depress plus bar once to add into   11

the lower dials. Clear keyboard and the 1 from the upper dials.

Step 2 Set the divisor, 15, on the right of keyboard.

Step 3 Shift carriage two places to the right so that the divisor, 15, on the keyboard is in direct alignment with the 18 in the lower dials. (The illustration shows how the machine appears at this point.) Move automatic divide control up.

Result Left upper dials 125 Quotient in red figures
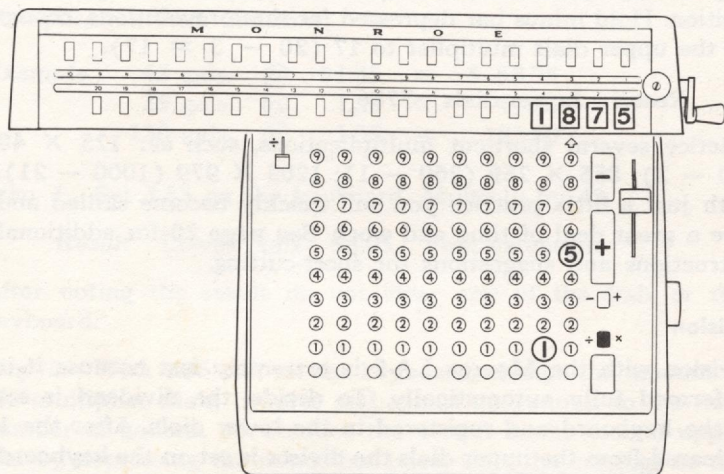
Division With Decimals

The rule for setting decimals for division is exactly the same as for multiplication: The number of decimal places in the lower dials must be the sum of the number of decimal places on the keyboard plus the number of decimal places in the upper dials.

Example 7695.23 ÷ 32.04 = 240.175

12 The answer to this problem should be carried out to three deci-

mal places so, since there are two decimals in both the dividend and divisor, the machine set-up is as follows:

Decimals Keyboard 2 ÷ Program Key Depressed
Upper Dials 3
Lower Dials 5

Step 1 Set 7695.23 on the right of the keyboard. Shift carriage to right so that the lower dials decimal point is lined up with the decimal point on the keyboard. Depress plus bar once. Clear keyboard and upper dials. A fast way is to depress the keyboard clear key and the minus bar simultaneously.

Step 2 Set 32.04 on the keyboard.

Step 3 Shift carriage so that the 3 on the keyboard is directly under and in line with the 7 in the lower dials. Divide.

Result Left upper dials 240.175

The .023 in the lower dials is the indivisible remainder.

If the left-hand digit of the dividend in the lower dials is not aligned with the left-hand digit of the divisor on the keyboard, or if the program key is not depressed for division, the machine divides continuously without the carriage shifting. It is stopped by moving the automatic divide control lever down to the normal position and depressing the plus bar. The problem should then be reset correctly.

A Few Applications to Business Jobs

Every business figuring job calls for one or more of the elementary processes of arithmetic that have been explained. The applications that follow are for a few of the most common ones and illustrate the adaptability of the Monroe to any work.

Invoice Checking

Example	63 lbs. Blend A dark	@ $1.28 =	$ 80.64
	208 lbs. ZZ mixture	@ .75 =	156.00
	14 lbs. No. 130 clear white @	4.27 =	59.78
	285 Total lbs.		$296.42

Decimals Keyboard 2 × Program Key Depressed
Upper Dials 4
Lower Dials 13-6

The results wanted are total pounds and total cost of the goods purchased for generally in proving invoices if the total checks it is assumed the extensions are correct.

Step 1 Holding the keyboard clear key depressed, set a 1 on the extreme left or tenth column of the keyboard. Set 1.28 on the right of the keyboard and multiply by 63. Clear upper dials only.

Step 2 Set .75 on the right of the keyboard and multiply by 208. Clear upper dials only.

Step 3 Set 4.27 on the right of the keyboard and multiply by 14.

Results Lower dials at left 285 Total pounds
Lower dials at right 296.42 Total of invoice

Clear the 1 from the left of the keyboard by depressing another key in the same column and then the zero clear key. Clear upper dials only as the next example shows how a discount is taken from the total of the invoice that remains in the lower dials.

Discount

Example   Total of invoice $296.42
Less 12½%
Net $259.37

Step 1   Copy 296.42 from the lower dials to the keyboard.

Step 2   With the carriage in the fourth position, multiply negatively by depressing the minus bar once.

Step 3   Shift carriage one place to the left and depress the minus bar for two machine cycles.

Step 4   Shift carriage one place to the left. Hold minus bar depressed for five machine cycles.

Result   Lower dials   259.3675 or 259.37   Net amount of invoice

The .125 in red figures in the left upper dials are proof that 12½% has been deducted.

Prorating

Example   Prorate the total expense of $3861.30 for heat and light to each of five departments according to the floor space each occupies.

DEPT.	SQUARE FEET	PRORATED AMOUNT
A	3200	976.00
B	1950	594.75
C	2670	814.35
D	1880	573.40
E	2960	902.80
	12660 Total sq. ft.	3861.30 Total expense

Decimals   Keyboard   5   ÷ Program Key Depressed
Upper Dials 4
Lower Dials 9

Step 1   Shift carriage to fifth position to align lower dials deci-   **15**

mal with keyboard decimal. Add square feet floor space of all departments. Result, 12660, total square feet. Clear dials and keyboard.

Step 2 Set 3861.30, total expense, on keyboard at decimal and depress plus bar to register in lower dials. Depress minus bar and keyboard clear key simultaneously to clear upper dials and keyboard. Set 12660 on keyboard. Divide. Result, left upper dials, .305, value factor per square foot.

Step 3 Set .305 on keyboard. Clear upper dials. Shift carriage to eighth position and multiply by 3200, square feet occupied by Dept. A.

> *Result* Lower dials $976.00
> Prorated amount for Dept. A

Do not clear machine.

Step 4 By means of plus and minus bars, change 3200 in upper dials to 1950, square feet for Dept. B.

> *Result* Lower dials $594.75
> Prorated amount for Dept. B

Do not clear machine.

Step 5 By means of plus and minus bars change 1950 to 2670, square feet for Dept. C.

> *Result* Lower dials $814.35
> Prorated amount for Dept. C

Continue in same way to find prorated amounts for Depts. D and E.

Double Multiplication

Double keyboard set-ups for multiplication can be useful in a number of applications, such as finding total cost and total selling price simultaneously. In the following example, a payroll application, three results are secured in one operation: Regular pay, overtime pay, and gross pay.

Example   Charles Dickens, whose rate is $1.96 per hour, works
47 hours.

Decimals   Keyboard   8-2   × Program Key Depressed
Upper Dials   8-2
Lower Dials   16-10-4

Step 1   Set 1.96, the hourly rate, on the keyboard at both second and eighth decimals.

Step 2   With carriage shift knob move carriage to extreme right and multiply by 40, regular hours, at eighth upper dials decimal.

Step 3   Move carriage to fourth position and multiply by 10.5, the overtime hours (7 × 1½).

Results   Lower dials at 16th decimal   78.40   Regular pay
Lower dials at 10th decimal   98.98   Gross pay
Lower dials at 4th decimal   20.58   Overtime pay

Simultaneous Multiplication and Division

Example   Find the number of dozens and the cost.

UNITS	NO. OF DOZ.	PRICE PER DOZ.	COST
765	63¾	$.53	$33.79

Decimals   Keyboard   8-5-2   ÷ Program Key Depressed
Upper Dials   3
Lower Dials   11-5

Step 1   Shift carriage to align eleventh lower dials decimal with fifth keyboard decimal. Set 765, the units, on keyboard at fifth decimal. Depress plus bar. Depress minus bar and keyboard clear key simultaneously to clear upper dials and keyboard.

Step 2   Set 11 (12 units per dozen less 1) on the keyboard at eighth decimal. Set .47 (1.00 — 53, complement of .53 price per dozen) on right of keyboard at decimal.
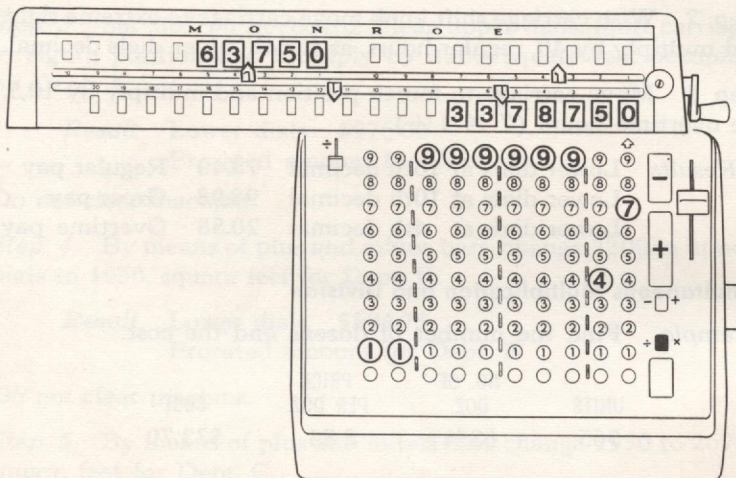
Step 3   Connect the two amounts on the keyboard by a bridge   **17**

of 9's so that the keyboard reads 11.999.999.47. Divide.

Results Left upper dials   63.75 or 63¾   Doz.
Lower dials   33.7875 or $33.79   Cost

The illustration shows the two amounts on the keyboard with bridge of 9's and the results in the left upper and the lower dials.

Percentage of Increase or Decrease

In figuring percentages, the upper dials of the Monroe automatically show the operator if a per cent is an increase or a decrease. If there are no 9's in the right upper dials the per cent is an *increase* and is in *black figures* in those dials. If 9's precede the figures in the right upper dials the per cent is a *decrease* and appears in *red figures* in the left upper dials.

Example   Find the per cent of increase or decrease in the sales made by three departments this month over last month.

DEPT.	SALES THIS MONTH	SALES LAST MONTH	PER CENT INCREASE	PER CENT DECREASE
R	50,230.13	38,467.28	30.58	
S	65,335.00	71,484.90		8.60
T	49,740.50	44,928.65	10.71	

Decimals Keyboard 2 ÷ Program Key Depressed
Upper Dials 5
Lower Dials 7

Department R

Step 1 With machine clear, shift carriage to align the decimal in the lower dials with the decimal on the keyboard. Set 50,230.13, this month's sales, on the keyboard. Depress minus bar.

Step 2 Set 38,467.28, last month's sales, on the keyboard. Depress and hold down plus bar until machine stops. Move up automatic divide control.

Result Right upper dials .30579 or 30.58% Increase

Department S

Step 1 Clear dials and keyboard. Shift carriage to align decimal in lower dials with decimal on keyboard. Set 65,335.00, this month's sales, on the keyboard. Depress minus bar.

Step 2 Set 71,484.90, last month's figure, on the keyboard. Depress and hold down plus bar until machine stops. Divide.

Result Left upper dials .08603 or 8.60% Decrease
The red figures indicate the answer is a decrease.

Department T

Step 1 Clear dials and keyboard. Shift carriage to align decimal in lower dials with decimal on keyboard. Set 49,740.50, this month's sales, on the keyboard. Depress minus bar.

Step 2 Set 44,928.65, last month's figure, on the keyboard. Depress and hold down plus bar until machine stops. Divide.

Result Right upper dials .10710 or 10.71% Increase **19**

More on Short-cut Multiplication

An Explanation

Short-cut multiplication is a method of combining plus and minus bar depressions to secure the required result in fewer machine cycles than by the regular way, using plus bar only.

For instance, in multiplying 455 × 38 using the plus bar only, the 455 set on the keyboard is multiplied by 3 and then 8 for a total of eleven machine cycles. The short-cut method is as follows:

Example   455 × 38

Step 1   The 455 is set on the keyboard and with the carriage in the second position multiplied by 4 (actually at this point the 455 has been multiplied by 40 as shown by the upper dials).

Step 2   The carriage is shifted to the first position and the minus bar is depressed for two cycles. The upper dials read 38 (40 − 2).

   Result   Lower dials   17290

Instead of three and eight or a total of eleven machine cycles, the short-cut way takes six, a savings of five cycles or nearly half.

Such savings quickly mount up to truly impressive totals on the average run of business figuring jobs. Other benefits of short-cutting are many. It is easier for the operator and with much less effort more results are produced in shorter time. In addition it calls for less work by the machine. Because the Quick-Shift control and the plus and minus bars, which are so important in short-cutting, are close together and can be used by the one hand without reaching, the Monroe LA-9 is ideally suited to this rapid, efficient system of figuring.

The operator who wants to be fully expert with the Monroe should be proficient in short-cutting. It is a skill that can be readily acquired through practice. The purpose of these pages is to give the few rules that can easily be remembered, some **20**   suggestions, and problems for practicing.

When to Short-cut

Always short-cut when multiplying by the digits 6, 7, 8, and 9

For example: In the multiplier 27 the 7 is short-cut; in 282 the 8 is short-cut; in 3089 the 8 and 9 are short-cut; in 88 both 8's are short-cut; the digit 7 alone is short-cut.

The digit 5 should be short-cut whenever it is next to any other short-cut figure.

For example: In the multiplier 957, all digits including the 5 are short-cut; in 295 both 9 and 5 are short-cut; in 153 the 5 is not short-cut.

How to Short-cut

Increase by 1 the digit that comes before the figure to be short-cut

For example: In the multiplier 29 the 2 is raised by 1 to 3 before the 9 is short-cut; in 3088 the 0 is raised to 1 before short-cutting the 88; in 468 the 4 is raised to 5 before short-cutting the 6 and 8; in 77 a 1 is set ahead of the first 7.

Mentally subtract from 9 the digit to be short-cut, except the last short-cut digit in an amount, and multiply the difference by means of the minus bar. Subtract from 10 the last digit being short-cut and multiply the difference with the minus bar.

For example: In multiplying by 382, the 8 is mentally subtracted from 10; in 69 the 6 is subtracted from 9 and the 9 from 10; in 4499 the first 9 is subtracted from 9 and the second from 10; in 52876 the 8 is subtracted from 9, the 7 from 9, and the 6 from 10; in multiplying by 7 alone, the 7 is subtracted from 10.

Applying the Rules

Here are a couple of multiplications that will illustrate these basic rules.

Example   22354 × 1971

Looking at the problem, the operator instantly sees there are two figures, 9 and 7, that can be short-cut and proceeds as follows:

Step 1   The multiplicand, 22354, is set on the keyboard. As 9 is the first digit to be short-cut the figure before it should be raised by 1. Carriage is shifted to the fourth position and by the plus bar 2 is registered in the fourth upper dial.

Step 2   Carriage is shifted to third position. According to the rule 9 is mentally subtracted from 9. Because 9 − 9 = 0, no operation is necessary in this position and the carriage is immediately shifted to the next place.

Step 3   As 7 is the last digit in the amount to be short-cut it is mentally subtracted from 10 (10 − 7 = 3). The minus bar is depressed for three subtractive multiplication cycles.

Step 4   Carriage is shifted to first position and a 1 is registered by a single plus bar depression.

Result   Lower dials   44059734
            Right upper dials   1971

Example   3405 × 857

Here all digits in the multiplier can be short-cut.

Step 1   The multiplicand, 3405, is set on the keyboard. Carriage is shifted to the fourth position and plus bar depressed once to register 1.

Step 2   Carriage shifted to third position. (9 − 8 = 1). Minus bar depressed once.

Step 3   Carriage shifted to second position. (9 − 5 = 4). Minus bar depressed for four subtractive cycles.

Step 4   Carriage shifted to first position. (10 − 7 = 3). Minus bar depressed for three cycles.

| *Result* | Lower dials | 2918085 |
| | Right upper dials | 857 |

Some Problems to Practice

234	×	19	801	×	16	451	×	70
411	×	7	1344	×	27	3522	×	148
3675	×	9	8110	×	529	51845	×	247
1984	×	8	8110	×	426	2420	×	599
550	×	18	8110	×	17	3800	×	349
2669	×	17	3481	×	46	21496	×	7028
3021	×	29	899	×	37	48181	×	8109
3021	×	7	2033	×	69	7421	×	1457
3021	×	28	3585	×	128	16823	×	7348
3021	×	19	7942	×	307	35128	×	6589

Short-cutting Large Multipliers

Most operators of the Monroe soon learn to short-cut but if they limit the process to small amounts they fail to take full advantage of the time-saving which increases with the size of the multipliers. With large amounts, short-cutting is just as simple for the principle is the same. After a little experience the operator, by a mere glance at large amounts, mentally breaks them down and treats them as groups of figures for short-cutting. For example: 8029 becomes 8/02/9; 309501 — 30/95/01; 1412973 — 1412/97/3; 891129 — 89/112/9.

A Few More Practice Problems

44882	×	23902	563007	×	107839
58921	×	11753	1204485	×	754428
103305	×	340929	345246	×	511687
86931	×	71180	100255	×	90219
245524	×	65096	873906	×	891136
402255	×	29817	408825	×	209128
50234	×	99008	290258	×	499075

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After reading these instructions, if there are any questions or if assistance is needed just call your local Monroe office. The nearest one is listed in the classified section of the telephone directory. Representatives are always glad to help for their responsibility does not end with placing a Monroe machine and they want to see that it is being used most efficiently. Personal instruction and information for applying the machine to specific figuring problems form an important part of Monroe's overall service, available to every user without cost or obligation.

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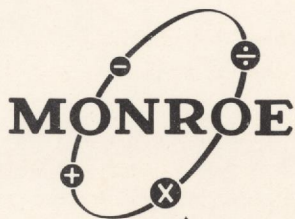
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